

# EXHIBIT B

CONFIDENTIAL - SUBJECT TO PROTECTIVE ORDER

1

1 UNITED STATES DISTRICT COURT  
2 DISTRICT OF MINNESOTA

3 - - - - -

4 In Re:  
5 Bair Hugger Forced Air Warming  
6 Products Liability Litigation  
7

8 This Document Relates To:  
9 All Actions MDL No. 15-2666 (JNE/FLM)

10 - - - - -

11

12 DEPOSITION OF JOHN P. ABRAHAM, Ph.D.

13 VOLUME I, PAGES 1 - 396

14 JULY 20, 2017

15

16

17 (The following is the deposition of JOHN P.  
18 ABRAHAM, Ph.D., taken pursuant to Notice of Taking  
19 Deposition, via videotape, at the offices of Ciresi  
20 Conlin L.L.P., 225 South 6th Street, Suite 4600, in  
21 the City of Minneapolis, State of Minnesota,  
22 commencing at approximately 9:26 o'clock a.m., July  
23 20, 2017.)

24

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## 1 P R O C E E D I N G S

09:26:46

2 (Witness sworn.)

3 JOHN P. ABRAHAM, Ph.D.,

4 Called as a witness, being first

5 duly sworn, was examined and

6 testified as follows:

## 7 EXAMINATION

8 BY MR. ASSAAD:

09:27:00

9 Q. Please state your name for the record.

09:27:02

10 A. John, J-O-H-N, Patrick, P-A-T-R-I-C-K,

09:27:09

11 Abraham, A-B-R-A-H-A-M.

09:27:12

12 Q. Have you ever had your deposition taken

09:27:13

13 before?

09:27:14

14 A. Yes.

09:27:15

15 Q. Approximately how many times?

09:27:18

16 A. Six or seven.

09:27:19

17 Q. Were they all in the capacity of an expert

09:27:21

18 witness?

09:27:23

19 A. Yes.

09:27:25

20 Q. And we'll get to those in a little bit. I'm

09:27:28

21 sure -- You've been through the drill before, but I

22 have to go over a few instructions --

23 (Interruption by the reporter.)

09:27:29

24 Q. You've been through the drill before, but

09:27:33

25 I'm going to go over a few instructions. Fair?

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09:52:41 1 the final draft was early 2016?

09:52:43 2 A. No.

09:52:45 3 Q. Okay. When did you complete the final  
09:52:47 4 draft?

09:52:49 5 A. Well the final draft would have been  
09:52:52 6 completed after I received the expert report from Dr.  
09:52:57 7 Elghobashi, so that part was added, that section was  
09:53:03 8 added after -- after that date.

09:53:05 9 Q. Okay. Could we -- Could we --

09:53:08 10 I'm going to just give you page numbers and  
09:53:10 11 let me just see if we could go through this quickly.

09:53:13 12 Would you agree with me that pages 1 through  
09:53:21 13 10, the first part, was completed by early 2016?

09:53:36 14 A. You said "10, the first part"?

09:53:38 15 Q. Page 10 and -- with paragraph subtitled B.

09:53:43 16 A. Yes. I -- To my best recollection, that  
09:53:46 17 would have been completed early 2016.

09:53:48 18 Q. Okay. And then the part with respect to the  
09:53:51 19 schlieren and -- and the criticisms of Elghobashi  
09:53:58 20 would have been done probably this year, after you  
09:54:01 21 received those reports.

09:54:02 22 A. Correct.

09:54:03 23 Q. Okay. And you've kept detailed bills with  
09:54:12 24 respect to all the work you've done in this case.

09:54:13 25 A. Yes.

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09:54:14 1 Q. Okay. So would you agree with me that this  
09:54:19 2 report was completed with respect to your CFD, not  
09:54:23 3 your criticisms of the schlieren, prior to Science Day  
09:54:27 4 where you testified in front of the Court in this  
09:54:29 5 case?

09:54:30 6 A. Yes.

09:54:46 7 Q. And let me just correct one thing. Go to  
09:54:50 8 page 11 and the top of 12. Was that -- part D,  
09:54:59 9 section D. Would that have been part of your report  
09:55:02 10 in January of 2016, or was that added later on?

09:55:12 11 A. That would have been part of the original,  
12 the early --

13 Q. Okay.

09:55:16 14 A. -- the early report.

09:55:19 15 Q. Okay. So now we have, just to be clear and  
09:55:21 16 for the record, pages 1 through 10 of -- section B of  
09:55:28 17 10, and pages 11, section D, which completes on  
09:55:31 18 section 12, was all completed in January of 2016.

09:55:34 19 MR. GOSS: Object to form.

09:55:36 20 MR. ASSAAD: Basis?

09:55:37 21 MR. GOSS: I think he said "early" 2016.

09:55:39 22 Q. Early 2016.

09:55:41 23 A. That is the best of my recollection.

09:55:43 24 Q. And definitely before Science Day in this  
09:55:45 25 case.

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10:10:24 1 Q. Okay. And is it with the 505 or the 750  
10:10:27 2 model?  
10:10:28 3 A. Both.  
10:10:28 4 Q. Okay. And you wrote this with B. D.  
10:10:35 5 Plourde; is that how you pronounce it?  
10:10:37 6 A. Plourde.  
10:10:38 7 Q. Plourde. And Ms. Vallez?  
10:10:40 8 A. Correct.  
10:10:41 9 Q. Okay. Did those two assist you with the CFD  
10:10:44 10 analysis that is the subject of your report?  
10:10:56 11 A. No.  
10:10:58 12 Q. So it's my understanding that the report --  
10:11:04 13 the -- the creation of the CFD and the results was all  
10:11:08 14 created by you?  
10:11:10 15 A. All of the results contained in the document  
10:11:13 16 and in my expert report were created by me.  
10:11:17 17 Q. What about the geometry?  
10:11:19 18 A. The geometry was not created by me.  
10:11:21 19 Q. Who was it created by?  
10:11:23 20 A. I don't know the answer to that.  
10:11:29 21 Q. Was it given to you?  
10:11:30 22 A. Yes.  
10:11:31 23 Q. By whom?  
10:11:33 24 A. If I recall, it was supplied by an attorney,  
10:11:38 25 but it would have been two years ago. I don't recall

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10:23:37 1 the files.

10:23:38 2 I was produced a AGDBT file. Is that the

10:23:42 3 CAD file?

10:23:43 4 A. Actually that would be the CAD file.

10:23:45 5 Q. Okay. And I was provided a TRN file, one

10:23:49 6 TRN file --

10:23:50 7 A. Yep.

10:23:52 8 Q. -- previously from the original subpoena.

9 A. Umm-hmm.

10:23:55 10 Q. Do you recall producing that?

10:23:56 11 A. Yes.

10:23:56 12 Q. And I received another TRN file that was

10:24:00 13 called the 2540 that is -- that was produced subject

10:24:07 14 to your -- the subpoena. Does that sound correct?

10:24:10 15 A. Yes.

10:24:10 16 Q. Are there any other files that you have?

10:24:15 17 A. I don't think there's any other files that I

10:24:16 18 have. I don't recall any other files that I have

10:24:21 19 sitting here now.

10:24:22 20 Q. Okay. So the only --

10:24:25 21 And I don't know this for sure, and I was

10:24:27 22 guessing based on the pictures that I received, but

10:24:29 23 the 2540, is that your work on the 505?

10:24:33 24 A. Yes, that's correct.

10:24:34 25 Q. And the one that was titled "Abraham," which

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10:28:21 1 A. Correct.

10:28:22 2 Q. And 264 is the 264th period of time that you

10:28:27 3 got a result.

10:28:29 4 A. Yes.

10:28:30 5 Q. So where are the other 263 results?

10:28:34 6 A. I -- I didn't archive them because the

10:28:37 7 results are enormous and they fill up the hard drive.

10:28:41 8 I think I have two others, just to verify that I re --

10:28:45 9 that I achieved steady state.

10:28:48 10 Q. Are they time steps before or after?

10:28:50 11 A. Both.

10:28:51 12 Q. How -- What's the -- the -- How far --

10:28:54 13 What number after?

10:28:56 14 A. I think 300.

10:28:57 15 Q. Okay. And what about before; do you

10:29:03 16 remember the --

10:29:04 17 A. I don't know.

10:29:05 18 Q. Okay. And I take it that 300, it actually

10:29:08 19 means something to you, the 300th time step?

10:29:12 20 A. Correct.

10:29:13 21 Q. Is a time step every second?

10:29:14 22 A. No.

10:29:15 23 Q. What's the time step, like in this case?

10:29:17 24 A. I don't recall what my time step was in the

10:29:19 25 calculation.



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10:29:20 1 Q. Is that something that's in your report?

10:29:25 2 A. I'll have to look. (Witness reviewing

10:30:14 3 exhibit.)

10:30:14 4 Q. We have a lot to cover and I'm going to go

10:30:17 5 page-by-page, so let's look for it when we start going

10:30:20 6 page-by-page through your report later on, okay?

10:30:23 7 A. Great.

10:30:24 8 Q. So did you do any runs --

10:30:31 9 Did you do any other runs before you came

10:30:33 10 with your final -- before you came up with your final

10:30:36 11 results?

10:30:39 12 A. Yes.

10:30:40 13 Q. Okay. What were different about those runs?

10:30:45 14 A. A calculation like this requires an initial

10:30:49 15 guess. These are what are called iterative

10:30:54 16 calculations, so you're guessing and checking and

10:30:56 17 guessing and checking. If you have a reasonable

10:31:00 18 initial guess, it speeds the -- what we call the

10:31:05 19 convergence.

10:31:06 20 So I did a calculation to get an initial

10:31:08 21 guess, which I then used as an input. And the effect

10:31:14 22 of that was to speed the process.

10:31:16 23 Q. Okay. How many of those did you do?

10:31:19 24 A. I think I would have done one.

10:31:20 25 Q. Okay. Do you have those results?

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10:31:22 1 A. No.

10:31:23 2 Q. So those have been destroyed.

10:31:25 3 MR. GOSS: Object to form.

10:31:27 4 A. Well, I mean I -- there's no reason to keep

10:31:30 5 them.

10:31:31 6 Q. That wasn't my question.

10:31:32 7 My question is: They're no longer -- They

10:31:34 8 no longer exist.

10:31:35 9 A. I no longer --

10:31:36 10 That's correct, they no longer exist.

10:31:38 11 Q. So you destroyed them.

10:31:39 12 MR. GOSS: Object to form.

10:31:42 13 Q. Let me -- Let me withdraw that question.

10:31:44 14 Do files --

10:31:46 15 Is this on your personal computer or a St.

10:31:49 16 Thomas computer?

10:31:50 17 A. St. Thomas computer.

10:31:51 18 Q. Okay. And do you have to go physically

10:31:57 19 delete the file, or are they automatically deleted

10:32:00 20 over a certain period of time?

10:32:01 21 A. I -- I actually do the deletion.

10:32:03 22 Q. So you deleted those files.

10:32:04 23 A. Correct.

10:32:06 24 Q. When did you delete those files?

10:32:07 25 A. Proba --

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.54

10:32:08 1 I don't know. I probably would have done it  
10:32:12 2 once I had obtained them and then I used the -- then I  
10:32:15 3 used them as the initial...

10:32:16 4 I don't -- I don't know when I did.

10:32:17 5 Q. Okay. Prior to writing this report?

10:32:24 6 A. I would have to guess. I don't know.

10:32:27 7 Q. So just so I understand, the only files  
10:32:30 8 available right now that you have on your computer are  
10:32:37 9 three -- with respect to the 750, are three TRN files,  
10:32:42 10 one which is the 264, one that's titled 300, and then  
10:32:47 11 one that's earlier than 264.

10:32:49 12 A. Correct.

10:32:50 13 Q. Okay. Any other files that you have  
10:32:51 14 available to you?

10:32:52 15 A. No.

10:32:54 16 Q. Okay. Are there any other files that you  
10:32:59 17 could obtain from your --

10:33:01 18 Well let me ask you this: Do you still have  
10:33:03 19 the model?

10:33:04 20 A. It's contained within the TRN.

10:33:06 21 Q. Okay. So if I want --

10:33:14 22 Can I reproduce your model through the TRN?

10:33:17 23 A. Yes.

10:33:17 24 Q. How would I do that?

10:33:18 25 A. The TRN contains all of the information,

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10:58:07 1 what temperature?

10:58:08 2 A. For the journal paper I ran a calculation  
10:58:12 3 where the temperature emerging from the Bair Hugger  
10:58:14 4 was 43 Celsius.

10:58:16 5 Q. Okay. Now the opinions that you're going to  
10:58:30 6 be giving in today's deposition, they're based on the  
10:58:45 7 initial CFD analysis that was completed by January of  
10:58:48 8 2016 with respect to the 750; correct?

10:58:52 9 A. They're based on the initial CFD analysis.  
10:58:54 10 I don't know if they were completed by January of  
10:58:57 11 2016, but they are based on the initial CFD analysis.

10:59:00 12 Q. Okay. And you agree with me there's nothing  
10:59:09 13 in your report that identifies the equations that you  
10:59:12 14 used with respect to your analysis of the problem.

10:59:17 15 A. I agree.

10:59:18 16 Q. Okay. Now I asked you what the time step  
10:59:29 17 was, and I know you looked through your report  
10:59:31 18 somewhere. Did you see anything about the time step  
10:59:33 19 that was used?

10:59:34 20 A. The only thing I saw was the statement that  
10:59:36 21 the results at other time steps lead to the same  
10:59:39 22 conclusions.

10:59:40 23 Q. Is -- Is a time step, is that a -- is it a  
10:59:42 24 constant time between, like, 263 and 264?

10:59:48 25 A. Yes.

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10:59:50 1 Q. And when you're talking about a time step  
10:59:52 2 are you like running it every second, every two  
10:59:55 3 seconds, every five seconds?

10:59:57 4 A. You -- It's like that, but you use -- you  
11:00:00 5 can use different time steps during your calculation.  
11:00:06 6 So, for example, you might want to use small time  
11:00:10 7 steps initially to get things going, and then you  
11:00:14 8 might use larger time steps, let's say, once you get  
11:00:18 9 to quasi steady and you want to go out further in time  
11:00:21 10 just to verify. So you can change the time step over  
11:00:24 11 ti -- over -- over -- during the calculation. But  
11:00:26 12 unless you do that, the time step is the same between  
11:00:29 13 each sequential time.

11:00:32 14 Q. So is it a second, a fraction of a second?

11:00:35 15 A. It would be a fraction of a second.

11:00:37 16 Q. And did you ever change the time steps?

11:00:38 17 A. Yes.

11:00:38 18 Q. At what point?

11:00:42 19 A. What do you mean by "at what point"?

11:00:44 20 Q. Like when did --

11:00:45 21 Did you change the time step between 1 and  
11:00:48 22 264?

11:00:49 23 A. I don't recall.

11:00:51 24 Q. Where would that information be?

11:00:59 25 A. I don't know if I recorded that. I don't

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11:02:11 1 edits; commas, periods. Nothing substantive, nothing  
11:02:17 2 that would change the conclusions or any substance of  
11:02:21 3 the report.

11:02:22 4 Q. Any of your colleagues look at it and offer  
11:02:24 5 any edits?

11:02:27 6 A. No.

11:02:27 7 Q. Okay. When was the journal article  
11:02:34 8 submitted?

11:02:44 9 A. I would estimate -- estimate April or May.

11:02:46 10 Q. Of this year?

11:02:47 11 A. Yes.

11:02:47 12 Q. Okay. Did you put the time step in the  
11:03:02 13 journal?

11:03:05 14 A. I would have to look. I don't know.

11:03:07 15 Q. Okay. If you do change the time step during  
11:03:13 16 a -- a run, is that something that you would disclose  
11:03:17 17 in the methodology of a journal paper?

11:03:22 18 A. The choice of time step is important to  
11:03:24 19 disclose, and its bearing on accuracy, but whether or  
11:03:28 20 not you change it may or may not be important.

11:03:32 21 Q. So you definitely would have disclosed,  
11:03:34 22 like, the -- that the -- Strike that.

11:03:36 23 The time step is an important piece of  
11:03:46 24 information that is usually submitted as a part of a  
11:03:51 25 CFD analysis in a scientific -- scientific research

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11:03:53 1 report for publication.

11:03:54 2 A. Yes.

11:03:56 3 Q. Okay. Because you would need the time step  
11:03:59 4 to reproduce the results.

11:04:02 5 A. Correct.

11:04:03 6 Q. Okay. Do you agree with me that there is a  
11:04:11 7 lot more information in your journal article than is  
11:04:14 8 contained in your expert report? Scientific  
11:04:18 9 information?

11:04:25 10 A. No.

11:04:26 11 Q. "No"?

11:04:27 12 A. No.

11:04:27 13 Q. Okay. Without the time step can I reproduce  
11:04:40 14 your results?

11:04:41 15 A. Yes.

11:04:42 16 Q. But you just told me it was very important  
11:04:43 17 to reproduce the results.

11:04:46 18 A. Correct.

11:04:47 19 Q. So without it and it's an important piece of  
11:04:51 20 information to reproduce results, how would I  
11:04:53 21 reproduce your results without a time step?

11:04:56 22 A. And actually let me clarify my earlier  
11:05:01 23 answer.

11:05:02 24 Provided that your time step is sufficiently  
11:05:04 25 small and that it allows you to reach quasi-steady

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11:07:46 1 stick the relevancy objections to your counsel and  
11:07:49 2 just answer my questions for me.

11:07:50 3 MR. GOSS: Well I think "relevance" has a  
11:07:51 4 meaning outside of the law, and if that's the way  
11:07:54 5 he's using it, then --

11:07:55 6 MR. ASSAAD: Fair enough.

11:07:56 7 MR. GOSS: -- let him use it.

11:08:03 8 BY MR. ASSAAD:

11:08:03 9 Q. But I would need those initial conditions to  
11:08:07 10 do the exact same thing that you did to get the  
11:08:10 11 results that are obtained in the TRN file that you've  
11:08:13 12 provided; correct?

11:08:15 13 A. That is a correct statement.

11:08:17 14 Q. Okay. And I'd also have to know whether or  
11:08:20 15 not you changed the time step between the initial  
11:08:25 16 conditions and time step 264; correct?

11:08:29 17 A. Correct.

11:08:30 18 Q. Okay. Otherwise, without those data -- that  
11:08:38 19 data, it would be impossible for me to replicate the  
11:08:44 20 results you found in your 264 TRN file; correct?

11:08:47 21 A. I disagree.

11:08:48 22 Q. How would I replicate and get the exact same  
11:08:52 23 numbers -- I'm not talking about your judgment -- I'm  
11:08:55 24 talking about the exact same calculated numbers in the  
11:08:59 25 264 TRN file, if I don't have the initial conditions?



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12:07:08 1 currently?

12:07:09 2 A. Version 18.

12:07:10 3 Q. Okay. But what version was the CFD done for

12:07:13 4 the 750?

12:07:15 5 A. 17.

12:07:16 6 Q. 17, or 17.1?

12:07:19 7 A. I don't know if it was 17.0 or .1.

12:07:23 8 Q. Would there be a difference in the results

12:07:24 9 if it was 17 or 17.1?

12:07:26 10 A. No.

12:07:28 11 Q. Okay. You're not an expert in medicine;

12:07:30 12 correct?

12:07:31 13 A. Correct.

12:07:31 14 Q. You're not an infectious disease expert;

12:07:34 15 correct?

12:07:34 16 A. Correct.

12:07:34 17 Q. So do you know how many CFUs it would take

12:07:37 18 to cause a periprosthetic joint infection?

12:07:41 19 A. No.

12:07:41 20 Q. You're not an expert in orthopedics;

12:07:42 21 correct?

12:07:43 22 A. Correct.

12:07:43 23 Q. You're not an expert in nursing; correct?

12:07:46 24 A. Correct.

12:07:46 25 Q. You're not an expert in filter

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12:27:11 1 A. Yes.

12:27:13 2 Q. By the way, you agree with me that particles  
12:27:15 3 do not follow airstreams; correct?

12:27:18 4 A. They may or may not follow airstreams.

12:27:21 5 Q. Depending on the size; correct?

12:27:24 6 A. Correct.

12:27:25 7 Q. Okay. Because particles have inertia.

12:27:28 8 A. That is correct.

12:27:28 9 Q. Okay. What size particles follow airstreams  
12:27:31 10 as compared to size particles that don't follow  
12:27:34 11 airstreams?

12:27:36 12 A. I cannot answer that question in the  
12:27:38 13 abstract because it depends on the airstreams.

12:27:40 14 Q. Okay. In the airstreams in this case --  
12:27:44 15 with the velocity of the airstreams in this case, do  
12:27:46 16 you have any idea, sitting here today, what -- what  
12:27:49 17 size particles would follow the airstreams as compared  
12:27:51 18 to not follow the airstreams?

12:27:54 19 A. No.

12:27:55 20 Q. Okay. The fact that we have eight people --  
12:28:26 21 seven people sitting in this room, does that affect  
12:28:28 22 the temperature of this room?

12:28:32 23 A. It may.

12:28:33 24 Q. Okay. But you can't assume that it doesn't.

12:28:44 25 A. The reason why I'm pausing is the answer

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12:32:25 1 A. I've seen portions of videos of either hip  
12:32:27 2 or knee re -- surgeries.

12:32:28 3 Q. I mean, you were at Science Day.

12:32:30 4 A. That's right.

12:32:30 5 Q. Okay. So I know you've seen it.

12:32:31 6 A. Well, hold on. But you asked two different  
12:32:34 7 types of surgeries, and my recollection is it was just  
12:32:36 8 one type. I could be wrong.

12:32:37 9 Q. Okay.

12:32:38 10 A. So I didn't want to overrepresent my video  
12:32:41 11 watching.

12:32:42 12 Q. So are you assuming that -- Strike that.

12:32:48 13 You agree that even if you have non-moving  
12:32:52 14 people in an operating room it's going to affect  
12:32:56 15 airflow.

12:32:57 16 A. Yes.

12:32:57 17 Q. Okay. Especially if the people are around  
12:33:03 18 the operating room table it's going to affect the  
12:33:05 19 airflow underneath the operating room table.

12:33:09 20 A. I don't know if I agree with that.

12:33:11 21 Q. Well you're -- you're causing -- you are  
12:33:14 22 causing blockages underneath the operating room table  
12:33:18 23 because you have people standing next to it, correct,  
12:33:21 24 and that's going to affect the air underneath the  
12:33:23 25 operating room table.

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12:34:22 1 What's the term used for how much an object  
12:34:24 2 absorbs heat, or -- Is it heat index or heat  
12:34:28 3 coefficient? Specific heat.

12:34:29 4 A. Specific heat.

12:34:31 5 Q. That's it, specific heat.

12:34:32 6 Was the specific heat ever -- did you use  
12:34:34 7 that at all with respect to your CFD analysis?

12:34:36 8 A. Yes.

12:34:37 9 Q. What -- What did you apply specific heat to?

12:34:39 10 A. The air.

12:34:40 11 Q. Anything else?

12:34:42 12 A. No.

12:34:44 13 Q. What about the blanket, the -- the Bair  
12:34:47 14 Hugger blanket?

12:34:51 15 A. I did not apply a specific heat to the Bair  
12:34:54 16 Hugger blanket.

12:34:55 17 Q. Okay.

12:34:56 18 A. It was not necessary.

12:34:59 19 Q. What about the drapes?

12:35:03 20 A. Same answer.

12:35:03 21 Q. What about the patient?

12:35:06 22 A. Same answer.

12:35:07 23 Q. So you didn't put -- you didn't apply any  
12:35:10 24 specific heat.

12:35:11 25 A. Correct.

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12:36:20 1 you see is this top interface, but when you look at  
12:36:24 2 the model you're not looking at the wood grains  
12:36:27 3 inside, and that's the difference.

12:36:28 4 Q. So is it like a void in the model?

12:36:33 5 A. It is a void in the model, but that -- using  
12:36:37 6 that term is misleading.

12:36:39 7 Q. I know. I don't know what...

12:36:40 8 Like, for example, I mean it -- there's the  
12:36:44 9 table, but it's not really there, it's just telling  
12:36:47 10 that, like, it's a barrier type thing.

12:36:50 11 A. That's right.

12:36:51 12 Q. Okay. So -- So you would agree with me that  
13 --

12:37:01 14 What's the word? Is it adiabatic?

12:37:07 15 A. Adiabatic is the word meaning insulated, and  
12:37:11 16 I -- I used adiabatic surfaces to represent solids.

12:37:16 17 Q. Okay. Which means that there's no heat  
12:37:17 18 transfer among the solids.

12:37:19 19 A. Correct.

12:37:19 20 Q. So you had no heat transfer between the Bair  
12:37:23 21 Hugger blanket and the drapes.

12:37:27 22 A. Correct.

12:37:29 23 Q. But we know in the real world that's not  
12:37:31 24 accurate.

12:37:35 25 A. In the real world you have cool air on one

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14:00:22 1 neck. Do you recall that testimony?

14:00:24 2 A. Yes.

14:00:25 3 Q. Do you have any calculations that you  
14:00:27 4 performed to support that assumption?

14:00:33 5 A. Are you asking me do I have calculations to  
14:00:36 6 support the idea that the air will rise?

14:00:40 7 Q. No. That the air will come from the arm --  
14:00:43 8 the air that's being blown on the end of the hand is  
14:00:46 9 going to migrate up the arm and out the head and neck  
14:00:50 10 of the patient.

14:00:52 11 A. I have no calculations.

14:00:53 12 Q. Okay.

14:00:54 13 A. I have my experience in buoyant flow motion.

14:00:57 14 Q. Okay. But you have no calculations;  
14:00:59 15 correct?

14:00:59 16 A. Correct.

14:01:00 17 Q. Do you have any experimental testing to  
14:01:03 18 indicate of such?

14:01:06 19 A. There is experimental testing. Well that's  
14:01:12 20 a complex answer, I'm going to give it a few ways.  
14:01:15 21 I'm going to give the answer in a few ways.

14:01:18 22 I have experimental testing that shows the  
14:01:21 23 air does not exhaust beneath the table.

14:01:23 24 Q. And what testing was that?

14:01:25 25 A. That was testing --

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14:08:33 1 A. That's probably the same thing as the  
14:08:34 2 Courant number I was mentioning.

14:08:36 3 Q. Well do you think it's the same number, or  
14:08:37 4 is it something similar to that number?

14:08:39 5 A. I think it's the same number, --

6 Q. Okay.

14:08:41 7 A. -- but I would have to check the --

8 Q. Okay.

14:08:44 9 A. -- whatever resource to verify.

14:08:46 10 Q. Now you mentioned earlier that --

14:08:50 11 Well let me ask you this question: Is the  
14:08:52 12 mesh that you used in the TRN file the mesh you put in  
14:08:55 13 Figure 2 on page 4?

14:09:07 14 A. I think it is.

14:09:08 15 Q. Okay. Well do you know one way or the  
14:09:11 16 other?

14:09:11 17 A. No.

14:09:11 18 Q. Okay. Well how would you formulate this  
14:09:13 19 mesh for your report if it did not come from the TRN  
14:09:18 20 file?

14:09:18 21 A. It is likely it is from the TRN file.

14:09:21 22 Q. Okay. So you believe that your mesh in the  
14:09:24 23 TRN file is as fine as it's in this -- depicted in  
14:09:28 24 Figure 2.

14:09:33 25 A. I don't recall if this image was taken from

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14:09:36 1 the TRN file, so I can't answer that "yes" or "no."

14:09:39 2 Q. Well where would this image be taken from?

14:09:44 3 A. As noted in this report, calculations were  
14:09:48 4 done for an 8.1 million-element mesh, and a mesh that  
14:09:54 5 was approximately 60 million.

14:09:55 6 Q. So you did calculations for a 60 million  
14:09:58 7 mesh?

14:09:59 8 A. That's correct.

14:09:59 9 Q. And are the results in this report?

14:10:01 10 A. No.

14:10:01 11 Q. Why not? Did it --

14:10:03 12 Did it converge?

14:10:04 13 A. Yes.

14:10:05 14 Q. And you've gotten results?

14:10:07 15 A. Correct.

14:10:07 16 Q. Why didn't you produce those results?

14:10:09 17 A. Because the results were the same, and it's  
14:10:12 18 our practice in computational fluid dynamics to show  
14:10:16 19 that your results are independent of mesh and then to  
14:10:18 20 show one set of results.

14:10:20 21 Q. So my understanding is the calculations for  
14:10:25 22 the six -- the 60-million-grid mesh no longer exist.

14:10:32 23 A. I don't know if they exist.

14:10:34 24 Q. Okay. How long did it take you to calculate  
14:10:37 25 the 60-million-grid mesh?



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14:33:05 1 my results are correct and reliable because of these  
14:33:08 2 great concerns.  
14:33:09 3 A. Correct.  
14:33:10 4 Q. Okay. How do you determine if a difference  
14:33:15 5 is significant?  
14:33:19 6 A. One way to determine it is to run both cases  
14:33:23 7 and to compare the results. That's probably the most  
14:33:26 8 direct way.  
14:33:28 9 Q. Okay. And it's quite clear that your  
14:33:31 10 results are much different than Elghobashi's results;  
14:33:33 11 correct?  
14:33:36 12 A. Correct.  
14:33:37 13 Q. But with respect to your analysis, you did  
14:33:44 14 not -- you did not analyze particle flow; correct?  
14:33:49 15 A. It was unnecessary.  
14:33:50 16 Q. That wasn't my answer -- my question.  
14:33:52 17 You did not analyze particle flow; correct?  
14:33:55 18 A. Correct.  
14:33:57 19 Q. Okay. Now you formulated your assumptions  
14:34:14 20 back in 2015; correct?  
14:34:20 21 A. Yes.  
14:34:21 22 Q. That was before any of the depositions in  
14:34:23 23 this MDL; correct?  
14:34:26 24 A. Correct.  
14:34:27 25 Q. Before any of these expert witnesses were

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15:22:17 1 Q. So people affect the flow; correct?

15:22:18 2 A. That is correct.

15:22:19 3 Q. Okay. Actually a -- a Bair Hugger device  
15:22:26 4 that's sitting on the floor that sucks up air is going  
15:22:29 5 to affect the flow; correct?

15:22:31 6 A. That is correct.

15:22:31 7 Q. Okay. And in fact you did not even put the  
15:22:33 8 Bair Hugger device in your model; correct?

15:22:35 9 A. That is correct.

15:22:36 10 Q. Okay. The fact that heat might be causing  
15:22:41 11 thermal plumes through, you know, the Bair Hugger  
15:22:44 12 heating the blankets through conduction which create a  
15:22:47 13 thermal plume is going to affect the flow; correct?

15:22:51 14 A. Correct.

15:22:51 15 Q. Okay. But none of those things you decide  
15:22:54 16 to put into your model because you thought they would  
15:22:57 17 be insignificant; correct? With what you're trying to  
15:23:00 18 determine.

15:23:02 19 A. Correct.

15:23:03 20 Q. And that was your judgment call; correct?

15:23:05 21 A. Yes.

15:23:06 22 Q. And other people in the scientific community  
15:23:08 23 may disagree with you on that; correct?

15:23:10 24 A. Yes.

15:23:43 25 Q. Sitting here today I cannot determine, or

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15:25:04 1 Q. Okay. For either the 505 or the 750?

15:25:10 2 A. Correct.

15:25:12 3 Q. Is that common practice with respect to  
15:25:15 4 people in the CFD community when submitting a  
15:25:19 5 peer-review paper on a model not to put the input  
15:25:25 6 conditions?

15:25:27 7 A. When you say "manuscript," are you talking  
15:25:29 8 about the manuscript that's my expert report?

15:25:34 9 Q. No. Your expert report's your expert  
15:25:36 10 report. Your manuscript is what's been submitted for  
15:25:38 11 publication.

15:25:39 12 A. Thank you for clarifying.

15:25:41 13 In the manuscript for publication I show --  
15:25:44 14 I show quasi-steady results have been achieved by  
15:25:47 15 comparing two results at different times, and that is  
15:25:51 16 sufficient, in my mind, for a peer-reviewed  
15:25:57 17 publication.

15:26:05 18 Q. Okay. Would you consider the Reynolds  
15:26:19 19 number --

15:26:19 20 Let me ask you this. Is the Reynolds number  
15:26:22 21 related to computational time in LES?

15:26:42 22 A. Yes.

15:26:43 23 Q. Okay. So the higher the Reynolds number is,  
15:26:46 24 the longer the computational time may be; correct?

15:26:52 25 It's Reynolds cubed is the -- the -- CFD that you guys

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15:32:18 1 of the Boussinesq model and we compared it to the  
15:32:21 2 ideal gas model, and we used a situation where the  
15:32:24 3 temperature difference was 150 degrees Celsius. We  
15:32:28 4 found that in that case the Boussinesq model did an  
15:32:31 5 excellent job of calculating the flow in an enclosure  
15:32:35 6 in a room.

15:32:36 7 Q. Airflow or particle flow?

15:32:38 8 A. Airflow.

15:32:38 9 Q. What about with respect to particle flow?

15:32:42 10 A. In my simulations I used airflow as a  
15:32:46 11 surrogate for particles because it's a worst-case  
15:32:49 12 scenario. I did not -- As I stated already, I did not  
15:32:53 13 model particles.

15:32:54 14 Q. So you assumed that airflow was the  
15:32:56 15 worst-case scenario as compared to particle flow?

15:32:59 16 A. Yes.

15:33:00 17 Q. And your basis behind that assumption?

15:33:03 18 A. Simple. Particles have a mass that is  
15:33:08 19 higher than their surrounding air, so particles like  
15:33:11 20 to settle out of the air. And in fact Said Elghobashi  
15:33:15 21 found his equivalent diameter by using the settling  
15:33:19 22 diameter. Particles like to fall out of the flow.  
15:33:22 23 Furthermore, particles have inertia. Multiple experts  
15:33:25 24 have already testified to this fact. Particles have  
15:33:28 25 inertia, and they find it hard to follow curved

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15:33:32 1 streamlines, and that tends to bring particles out of  
15:33:35 2 the flow.

15:33:35 3 So for those two reasons I decided to use  
15:33:39 4 the worst-case scenario, which is air. I tracked air  
15:33:42 5 particles which have no gravity term and no inertia  
15:33:46 6 term. So in that respect it's a worst-case  
15:33:49 7 calculation.

15:33:52 8 Q. Well, I disagree with you mathematically and  
15:33:55 9 as a worst-case scenario, and I'm going to tell you  
15:33:58 10 why.

15:33:58 11 You don't think turbulence causes the spread  
15:34:00 12 of particles?

15:34:03 13 A. I think turbulence does cause the spread of  
15:34:04 14 particles.

15:34:05 15 Q. And don't you think that temperature  
15:34:06 16 differences affect the turbulence intensity?

15:34:10 17 A. And in fact I included that in my analysis.

15:34:13 18 Q. So you agree with me they do; correct?

15:34:15 19 A. I agree that temperature affects turbulence.

15:34:18 20 Q. Okay. And the fact that particles don't  
15:34:20 21 follow streamlines is that they may -- they may act  
15:34:25 22 with -- they may follow velocity vectors caused by  
15:34:30 23 turbulence; correct?

15:34:41 24 A. I'm not struggling because I can't answer  
15:34:43 25 it, I'm struggling to interpret your question and to

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15:34:45 1 figure out a way to artfully answer.

15:34:48 2 Turbulence affects particles, and in fact

15:34:54 3 particles can affect turbulence. Particles have

15:34:58 4 inertia, and when a particle gets caught in an eddy it

15:35:02 5 likes -- it has a tendency to leave that eddy.

15:35:06 6 So if you look at the simulations that I

15:35:07 7 have where the flow goes down, curves against the

15:35:11 8 ground and then curves against the wall, particles

15:35:14 9 would have a tendency to leave the flow at that

15:35:16 10 instant and land on the ground and the wall and

15:35:19 11 surfaces, and in fact that's why we dust. We dust, if

15:35:24 12 we're cleaning our house, because particles collect on

15:35:27 13 a table. But there's not air particles collecting on

15:35:30 14 this table, there's particles in -- in the air.

15:35:34 15 By giving -- I essentially gave my particles

15:35:36 16 a zero mass so they had no weight, and zero inertia so

15:35:43 17 that they would perfectly follow the flow. And

15:35:46 18 whether that flow was turbulent or not they follow the

15:35:49 19 flow. That's why it's a worst-case scenario.

15:35:51 20 Q. Well I think you just misspoke, sir, because

15:35:53 21 you didn't use particles in your analysis; correct?

15:35:55 22 A. I did not misspeak.

15:35:57 23 Q. Well you did, because you said I gave my

15:35:59 24 particles no inertia and no mass, but you did not use

15:36:02 25 particles in your CFD; isn't that correct?

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15:36:05 1 A. Actually the particles I used were air  
15:36:07 2 particles. I tracked air. So we can talk about  
15:36:10 3 particles, essentially I used oxygen and nitrogen  
15:36:14 4 molecules. I followed the air, not a solid,  
15:36:19 5 inertia-filled particle through the air.

15:36:21 6 Q. So you do not insert particles that have a  
15:36:23 7 mass into your system; correct?

15:36:25 8 A. That is correct.

15:36:26 9 Q. Okay. And you agree that the reason why  
15:36:32 10 there are particle models is because people in the  
15:36:36 11 scientific community understand that particles do --  
15:36:41 12 always don't react or follow airstreams; correct?

15:36:44 13 A. That's correct.

15:36:45 14 Q. Okay.

15:36:46 15 A. In fact I've done particle modeling in the  
15:36:48 16 peer review --

15:36:51 17 Q. I know what you've done. I'm -- Just answer  
15:36:51 18 my questions, please.

15:36:52 19 A. Okay.

15:36:52 20 Q. So the fact that --

15:36:53 21 I mean, turbulence has a significant effect  
15:36:57 22 on particle flow; don't you agree?

15:36:59 23 MR. GOSS: That's asked and answered, but  
15:37:00 24 if you have more to say, please go ahead.

15:37:04 25 A. They may, and they may not.

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15:42:51 1 close enough to make the judgment -- judgment that

15:42:54 2 it's a quasi-steady solution; correct?

15:42:58 3 A. From the data --

15:42:59 4 From the single TRN file that I provided,

15:43:01 5 correct.

15:43:02 6 Q. Okay. And nothing in the report.

15:43:04 7 A. Well I stated it in the report.

15:43:06 8 Q. That's your opinion.

15:43:07 9 But I'm saying for someone to ascertain and

15:43:10 10 make a determination of whether or not your judgment

15:43:13 11 is correct, no one could do that right now based on

15:43:16 12 the expert report; correct?

15:43:18 13 MR. GOSS: Argumentative, asked and

15:43:19 14 answered.

15:43:19 15 A. Correct.

15:43:20 16 Q. Okay. Just out of curiosity, when you ran

15:44:26 17 the model with 8.1 million cells that you said took

15:44:30 18 roughly 40 days, was that the only program that was

15:44:36 19 running on that machine?

15:44:38 20 A. I don't know.

15:44:39 21 Q. Okay. Does anyone else have access to that

15:44:43 22 machine that you used?

15:44:44 23 A. Yes.

15:44:45 24 Q. Okay. Is it a single desktop computer or

15:44:50 25 does it use, like, a combination of computers to



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15:48:31 1 A. I disagree.

15:48:33 2 Q. Okay.

15:48:33 3 A. I would have to understand more about the  
15:48:35 4 hypothetical that you're --

5 Q. Well --

15:48:37 6 A. -- suggesting.

15:48:40 7 Q. -- I could write a code that solves for the  
15:48:42 8 Navier-Stokes equations and I get wrong mathematical  
15:48:47 9 results and therefore my code is not verified even  
15:48:49 10 though I could write down the Navier-Stokes equations;  
15:48:51 11 correct?

15:48:52 12 A. I agree.

15:48:53 13 Q. Okay. So a code needs to be verified;  
15:48:55 14 correct?

15:48:56 15 A. I agree.

15:48:57 16 Q. Okay. So the code is more than just the  
15:49:03 17 equation, it's actually the code is what they use --  
15:49:06 18 do to solve the equation; correct?

15:49:10 19 A. In this context "code" usually refers to the  
15:49:15 20 numerical algorithm that's used to solve the  
15:49:18 21 Navier-Stokes equations.

15:49:19 22 Q. So the mere fact that I know the equation  
15:49:21 23 doesn't mean I have the correct algorithm to solve the  
15:49:24 24 equation accurately; correct?

15:49:26 25 A. I agree --

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15:58:24 1 particle flow in air.

15:58:26 2 Q. Would you -- Would you --

15:58:28 3 Would you consider yourself a particle

15:58:29 4 expert in high-speed flows?

15:58:32 5 A. No.

15:58:33 6 Q. Would you consider yourself an expert in low

15:58:35 7 -- with particles in low-speed flows?

15:58:38 8 A. Probably not.

15:58:40 9 Q. Okay. Have you ever done any work for the

15:58:46 10 Department of Defense?

15:58:48 11 A. Via a subcontractor, yes.

15:58:52 12 Q. What about directly with the Department of

15:58:54 13 Defense?

15:58:54 14 A. No.

15:58:55 15 Q. Have you done any work with the -- with any

15:58:58 16 part of the military?

15:59:01 17 A. No.

15:59:02 18 Q. Do you have access to the military

15:59:03 19 supercomputer?

15:59:04 20 A. No.

15:59:05 21 Q. Do you have access to a computer that could

15:59:07 22 do DNS modeling?

15:59:09 23 A. Yes.

15:59:10 24 Q. What computer?

15:59:12 25 A. The ANSYS model, the ANSYS software has the

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16:17:54 1 quasi-steady solution in my results; correct?

16:17:57 2 MR. GOSS: Calls for speculation.

16:17:59 3 A. That's a complex --

16:18:00 4 Could you re -- rephrase it, re-ask it?

16:18:02 5 Q. Well just assume that I -- I run your model

16:18:04 6 and I cannot come to a quasi-steady solution, okay? I

16:18:09 7 could determine whether or not you came to a

16:18:11 8 quasi-steady solution if I had your initial -- your

16:18:15 9 initial conditions and your final result; correct?

16:18:27 10 A. It's a --

16:18:29 11 That was a very cumbersome question. Could

16:18:31 12 you just --

16:18:31 13 Q. Let's make it: I cannot independently

16:18:33 14 verify that you have -- your solution is a

16:18:37 15 quasi-steady solution without another TRN file or even

16:18:42 16 -- or the initial conditions; correct?

16:18:44 17 A. You could not verify that my results were

16:18:47 18 quasi-steady without another TRN file.

16:18:50 19 Q. And, I mean, these are transient results,

16:18:53 20 TRN files; correct?

16:18:54 21 A. Correct.

16:18:55 22 Q. And all transient results are dependent on

16:18:59 23 the initial conditions.

16:18:59 24 A. That is correct.

16:19:00 25 Q. Okay. So your failure to provide the

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16:20:23 1 there's different ways of doing it. But -- But I  
16:20:26 2 would agree with you to know if this set of results  
16:20:28 3 right here is quasi-steady [indicating Exhibit 1] you  
16:20:32 4 would want to compare two different TRN files.

16:20:34 5 Q. Okay. Because you didn't compare your  
16:20:36 6 results to anyone else's results; correct?

16:20:38 7 A. I did not --

16:20:39 8 Well I compared my results to an experiment.

16:20:42 9 Q. Okay. But I'm talking about your  
16:20:43 10 computational fluid -- your mathematical results.

16:20:47 11 A. Correct.

16:20:48 12 Q. Okay. For example, if I wanted someone on  
16:21:27 13 my team to -- Well, strike that.

16:21:41 14 Part of the methodology in doing CFD is to  
16:22:21 15 have a proper model; correct?

16:22:25 16 A. Yes.

16:22:26 17 Q. Proper boundary conditions; correct?

16:22:28 18 A. Yes.

16:22:28 19 Q. And you need to put in initial conditions;  
16:22:31 20 correct?

16:22:32 21 A. That is correct.

16:22:33 22 Q. Okay. Without the initial --

16:22:36 23 That is mandatory in a CFD analysis is  
16:22:40 24 having initial conditions; correct?

16:22:42 25 A. That is correct.

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16:22:43 1 Q. And you have not provided the initial  
16:22:44 2 conditions to the plaintiff in this case; correct?

16:22:48 3 MR. GOSS: Asked and answered multiple,  
16:22:49 4 multiple times.

16:22:52 5 A. That is correct.

16:22:53 6 Now you can get the same results by having  
16:22:57 7 different initial conditions.

16:22:59 8 Q. But the methodology requires initial  
16:23:01 9 conditions; correct?

16:23:01 10 A. The methodology requires initial conditions,  
16:23:04 11 it doesn't require the same ones.

16:23:05 12 Q. Let's go to your CFD model.

16:23:21 13 (Discussion off the stenographic record.)

16:23:31 14 (Files brought up on a projector.)

16:23:31 15 BY MR. ASSAAD:

16:23:31 16 Q. Now I'm going to represent to you that the  
16:23:34 17 name of this file is Abraham 0000001, which is a Bates  
16:23:40 18 number that -- your TRN file that is TRN 264.

16:23:50 19 MR. GOSS: Can you -- I'm not suggesting  
16:23:51 20 that it isn't that, but can you give us, at the end  
16:23:54 21 of the deposition, a thumb-drive copy?

16:23:55 22 MR. ASSAAD: Is there any way we can go to  
16:23:57 23 the 264 TRN -- dot TRN number?

16:24:02 24 (Screen being manipulated.)

16:24:02 25 MR. GOSS: And I don't -- I don't question

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16:44:42 1 of that inlet --

2 (Screen image modified.)

16:44:44 3 THE WITNESS: Thank you.

16:44:46 4 A. I would agree with you that the exact shape

16:44:48 5 of that inlet shown in red would differ slightly from

16:44:53 6 in actual practice. I agree.

16:44:55 7 Q. "Slightly"? Or --

16:44:56 8 Do you know, sitting here today?

16:44:58 9 A. Well I will say this. I don't think the cha

16:45:01 10 -- the difference would have a material impact on the

16:45:03 11 results.

16:45:04 12 Q. I understand that's your opinion, sir. But

16:45:05 13 let's just not make --

16:45:07 14 I don't want to know about what your

16:45:08 15 opinions on the results. I just want to know, do you

16:45:10 16 know whether or not that drape shape is accurate,

16:45:13 17 sitting here today?

16:45:14 18 A. That drape shape would not be perfectly

16:45:16 19 accurate.

16:45:16 20 Q. Okay. Did you take any measurements of the

16:45:19 21 shape, or pictures?

16:45:21 22 A. No.

16:45:22 23 Q. And in fact you did not even create this;

16:45:25 24 did you?

16:45:26 25 A. Correct.

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16:45:27 1 Q. Okay.

16:45:27 2 A. I did not create it.

16:45:28 3 Q. 3M created this; correct?

16:45:30 4 A. 3M created the geometry.

16:45:32 5 Q. Which is the shape of the -- of the Bair

16:45:34 6 Hugger inlet.

16:45:34 7 A. Yes.

16:45:35 8 Q. Okay. You never did any measurements, you

16:45:39 9 yourself or anyone on your team, to determine the

16:45:41 10 shape of the Bair Hugger inlet; correct?

16:45:43 11 A. That is correct.

16:45:44 12 Q. Okay. So sitting here today, you cannot

16:45:51 13 independently verify the shape of that Bair Hugger

16:45:56 14 inlet, you're relying on what 3M has provided to you.

16:46:00 15 A. I relied, for the three dimensional object

16:46:06 16 -- all the three dimensional objects, on what 3M

16:46:08 17 provided to me.

16:46:09 18 Q. So you, sitting here today, cannot

16:46:11 19 independently verify that shape, you are relying on

16:46:13 20 what 3M has provided to you.

16:46:14 21 MR. GOSS: Asked and answered.

16:46:15 22 A. Correct.

16:46:15 23 Q. Okay. Now based on this geometry it was 3M

16:46:28 24 that came up with the assumption of the Bair Hugger

16:46:31 25 inlet; correct?

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17:44:26 1 have a different mass flow rate because of the  
17:44:28 2 resistance to the motor?

17:44:30 3 A. That is correct.

17:44:30 4 Q. Okay. And you agree with me that the 750  
17:44:35 5 has a different volumetric flow without a blanket than  
17:44:39 6 the 505 or the Smiths Medical or any other non-750  
17:44:44 7 blower out there.

17:44:46 8 A. I agree --

17:44:47 9 Q. Okay.

17:44:48 10 A. -- that blowers have a different flow rate.

17:44:55 11 Q. So sitting here today you're going to  
17:44:57 12 testify to a jury in Minnesota that you've obtained  
17:45:03 13 these very similar numbers to the Bair Hugger  
17:45:05 14 experiments that -- of Exhibit 9 based on your memory  
17:45:10 15 and experience of working with different forced-air  
17:45:14 16 warming devices.

17:45:17 17 A. What I can tell you is I had the number in  
17:45:21 18 my mind of what the flow rate through these systems  
17:45:23 19 were. I used this -- [Exhibit 9] I received this  
17:45:27 20 datasheet and it verified, hey, this is very close,  
17:45:32 21 and so I used my numbers.

17:45:35 22 Q. But your -- you can't reproduce your numbers  
17:45:38 23 from some physical document or even notes.

17:45:40 24 A. That is correct. I cannot.

17:45:42 25 Q. Okay. And in fact -- Strike that.



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17:58:31 1 Q. Where'd you take the measurements?

17:58:32 2 A. Multiple locations.

17:58:33 3 Q. Where?

17:58:34 4 A. All -- I walked all the way around the  
17:58:37 5 perimeter of the OR table multiple times and I took  
17:58:40 6 measurements at different heights.

17:58:41 7 Q. You agree the image that we put up regarding  
17:58:43 8 the temperature differences in the room, that many of  
17:58:47 9 the temperatures around the OR table were less than 61  
17:58:50 10 degrees; correct?

17:58:51 11 A. Some temperatures were slightly less than  
17:58:53 12 61.

17:58:54 13 Q. Okay. And by the way, do you believe that  
17:58:56 14 your CFD showed -- only has 8.1 million cells?

17:59:02 15 A. I believe that's true.

17:59:03 16 Q. If the CFD showed that there was over 9  
17:59:06 17 million, would you disagree with that, the TRN file?

17:59:09 18 A. No.

17:59:09 19 Q. Okay. So this would be incorrect about 8.1  
17:59:12 20 million cells then; correct? That you've testified  
17:59:14 21 earlier and that's in your validation.

17:59:18 22 A. Well would -- if -- if my TRN file shows  
17:59:20 23 that I have 9 million cells, it means that, if  
17:59:23 24 anything, it's more accurate.

17:59:26 25 Q. It just means that there's more cells. It

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18:57:27 1 correct?

18:57:28 2 A. Correct.

18:57:28 3 Q. And that's what you did in this case. You  
18:57:30 4 saw what he did and you say, I disagree.

18:57:32 5 A. That's right.

18:57:33 6 Q. Correct?

18:57:33 7 And you did not provide one equation to the  
18:57:41 8 plaintiffs that we could do the same type of critique  
18:57:44 9 that you did to Elghobashi; correct?

18:57:46 10 MR. GOSS: You mean other than the TRN  
18:57:47 11 file?

18:57:49 12 Q. There's no equations in the TRN file; are  
18:57:52 13 there?

18:57:53 14 A. Well, I mean, the equations are built into  
18:57:55 15 the software so you can't really separate the  
18:57:57 16 equations from the software. But here is -- here is  
18:58:00 17 the issue --

18:58:00 18 Q. My question --

18:58:02 19 Let me ask it simple, simple. In Exhibit 1,  
18:58:04 20 2 or any of the exhibits we saw today that were  
18:58:07 21 produced by you, okay, except for the Elghobashi  
18:58:11 22 exhibits or any of the citings --

18:58:13 23 Let's go back. Exhibit 1 and 2 of your  
18:58:18 24 report, your CV, as well as your expert report, you  
18:58:22 25 agree with me that there is not one mathematical

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18:58:27 1 equation that was provided to the plaintiffs in this  
18:58:31 2 case.

18:58:32 3 A. There is no equation.

18:58:34 4 Q. So you agree with me. "Yes" or "no"?

18:58:36 5 A. I agree with you, --

18:58:37 6 Q. Okay.

18:58:38 7 A. -- but the information is listed there that  
18:58:41 8 would allow someone to reproduce the results.

18:58:44 9 Q. Okay. You agree with me that there's not  
18:58:46 10 one mathematical equation in your expert report;  
18:58:49 11 correct?

18:58:49 12 MR. GOSS: I think he -- I think he  
18:58:50 13 answered that.

18:58:52 14 A. I agree, --

15 Q. Okay.

18:58:53 16 A. -- and it's not necessary.

18:58:54 17 Q. And you agree with me there's not one number  
18:58:56 18 or -- like equation that uses numbers to show what you  
18:58:59 19 did to make any of your assumptions in your expert  
18:59:03 20 report; correct?

18:59:04 21 MR. GOSS: Asked and answered.

18:59:06 22 A. I agree, I think I've answered that.

18:59:44 23 Q. Okay. You disagree with Figure 3 of Exhibit  
18:59:49 24 15; correct?

18:59:51 25 A. Yes.